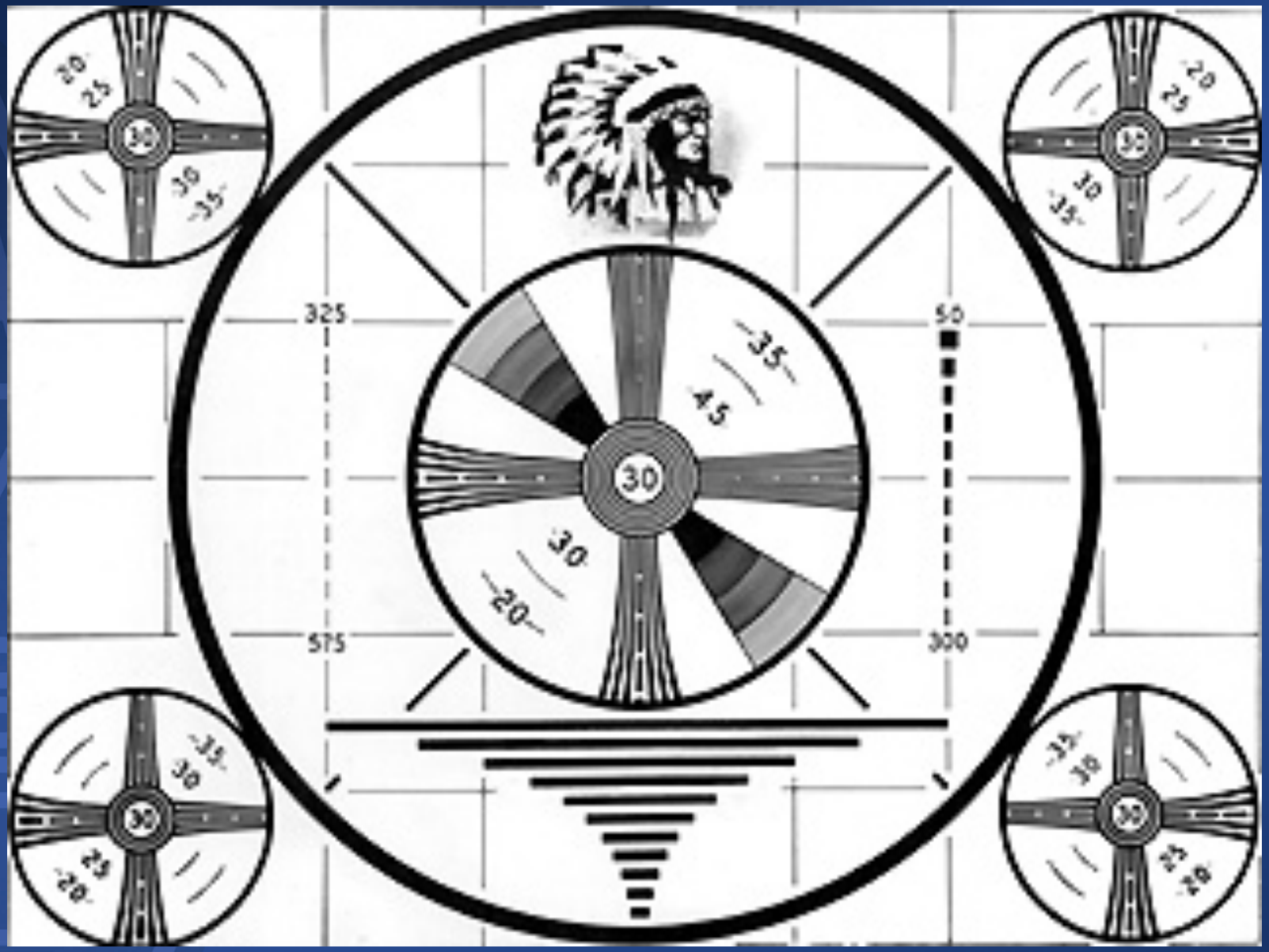

ARRL The national association for AMATEUR RADIO

- Ed Hare, W1RFI, ARRL Lab Manager

ARRL The national association for AMATEUR RADIO

The ARRL Lab:
Trials, Tribulations and (Tall?) Tales

Ed Hare, W1RFI
ARRL Laboratory Manager

ARRL The national association for AMATEUR RADIO

These are not tall tales!

- Everything you are about to see is true!
- I will tell you things you won't read in QST
- Remove ARRL officials from room
- No recording of any type
- Everyone must be sworn to absolute secrecy!

ARRL The national association for AMATEUR RADIO

The rules of my presentations…

- **Everybody has to laugh at my jokes!**
- **Unfortunate incident last time…**
- **Taking pictures … suck it in…**
- **Ask questions any time …**
- **Falling asleep …**
- **Last presentation got very dry…**

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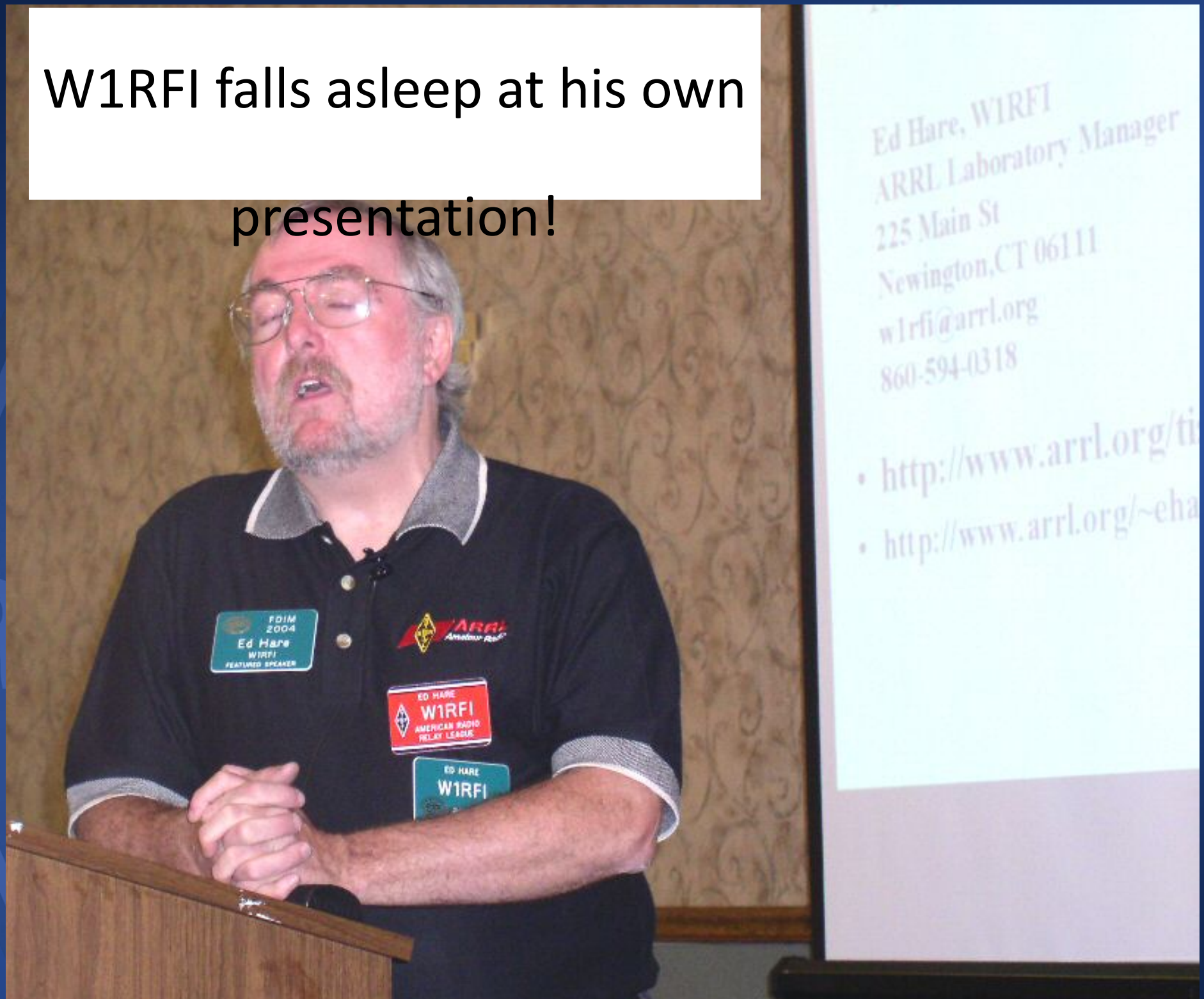
W1RFI falls asleep at his own presentation!



The ARRL Laboratory Staff

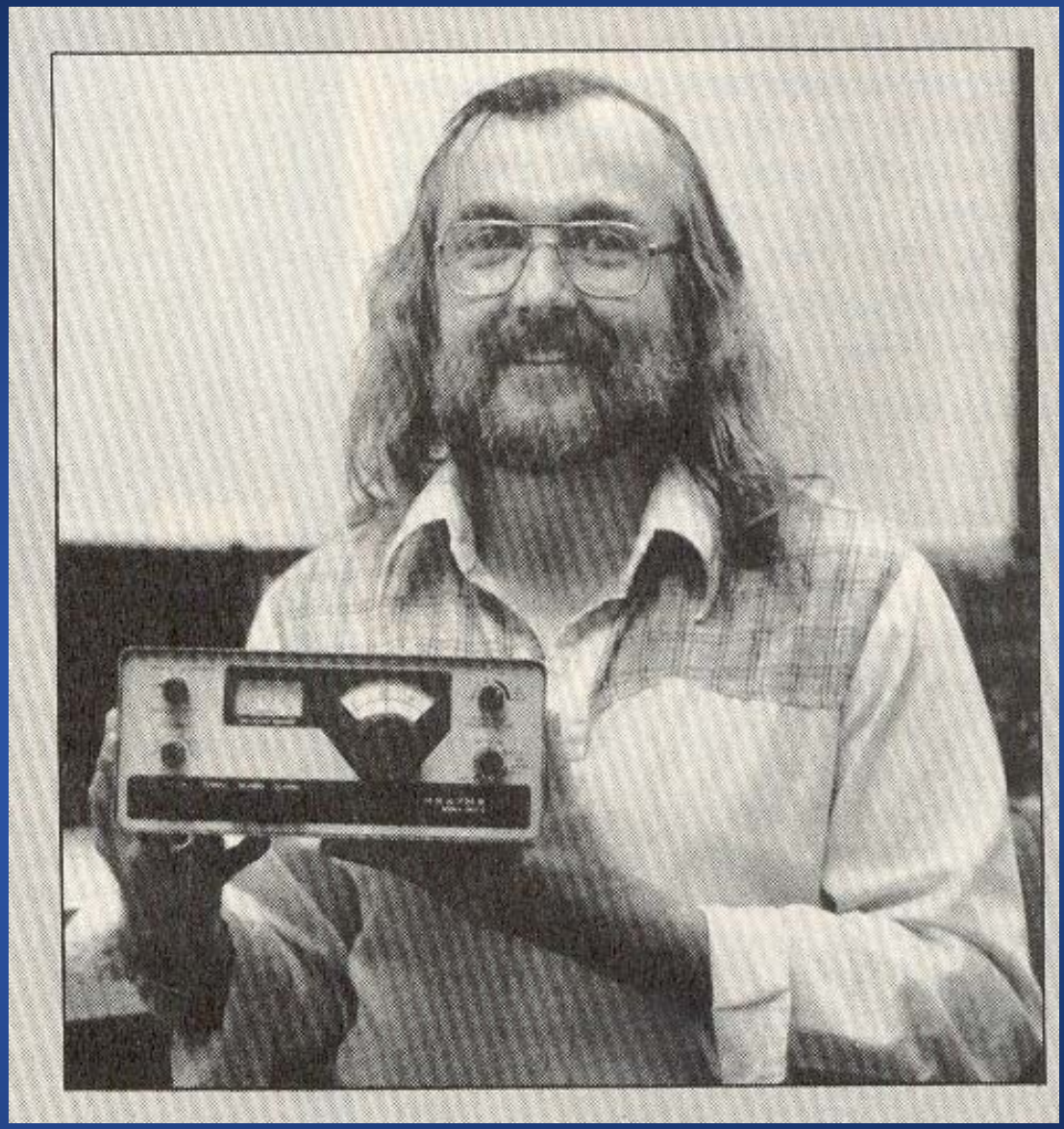
The Lab Staff

This would be me!

- Ed Hare, W1RFI, vanity call
- ARRL Lab Manager
- AKA “The Lab Dad”
- Ham since 1963
- At ARRL since 1986
- Ham interests – QRP and CW
- Professional interest – EMC
- Personal interests – Super-secret fishing holes, stamp collecting

ARRL The national association for AMATEUR RADIO

Here's a picture of me in my hippie days (1988), holding the modified HW-8 I used to achieve Worked All States with 250 milliwatts



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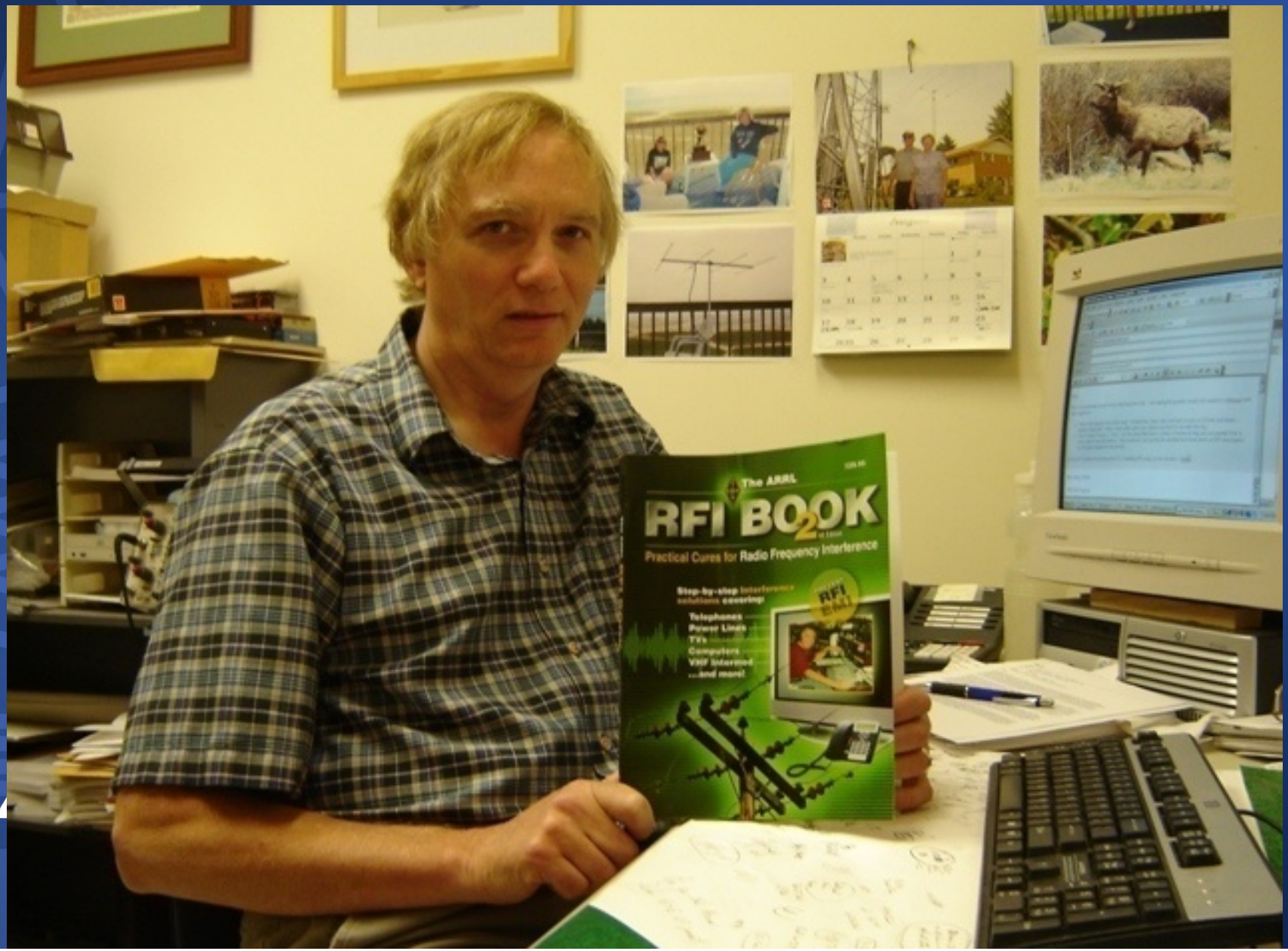
Zack Lau
W1VT
Senior Lab Engineer

ARRL The national association for AMATEUR RADIO

Mike Gruber, W1MG
RFI Expert



A tale of Mike Gruber

- Too outrageous to put on slide
- Amateur Radio on the Go Book
- Copies given to two hams who helped with book…

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Bob Allison, WB1GCM

- ARRL Test Engineer
- Coventry, CT
- Ham since 1974
- University of Hartford
- 28 years TV Engineer
- At ARRL Lab for 2 Years
- XYL: Kathy, KA1RWY
- (LoTW)

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6E 15971 SB011A 02/07/00 01:32
LAMPS
AMS PRO

SAFETY
FIRST
WEAR
GOGGLES
ON
BEVIS
BECK-STOVER-STILES

W1AW
I worked ALL CLEAN SWEEP!
ASTRON

US Amateur Radio Bands
Effective Date
February 23, 2007
ARRL

In the Lab is a glass display case that holds some of the projects that the Lab has worked on over the years.

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The Incredible Saga of the Tuna Tin II

Vintage Display

The ARRL Lab Functions

- **The ARRL Lab provides a wide range of technical services to support ARRL and its operation**
- **Product Review Testing**
- **QST Advertising Acceptance**
- **Technical Information Service**
- **Support of ARRL Field Organization**
- **Support of other HQ staff**
- **Technical Advocacy for Amateur Radio**
- **Member contact (clubs, hamfests)**

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Technical Information Service (TIS)

- ARRL TIS web pages
- Information in articles and ARRL publications
- Individual answers to questions

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TIS: The most common question…

How do I find information about <name the subject>

The Lab has a secret internal tool that lets us quickly answer that question for members…

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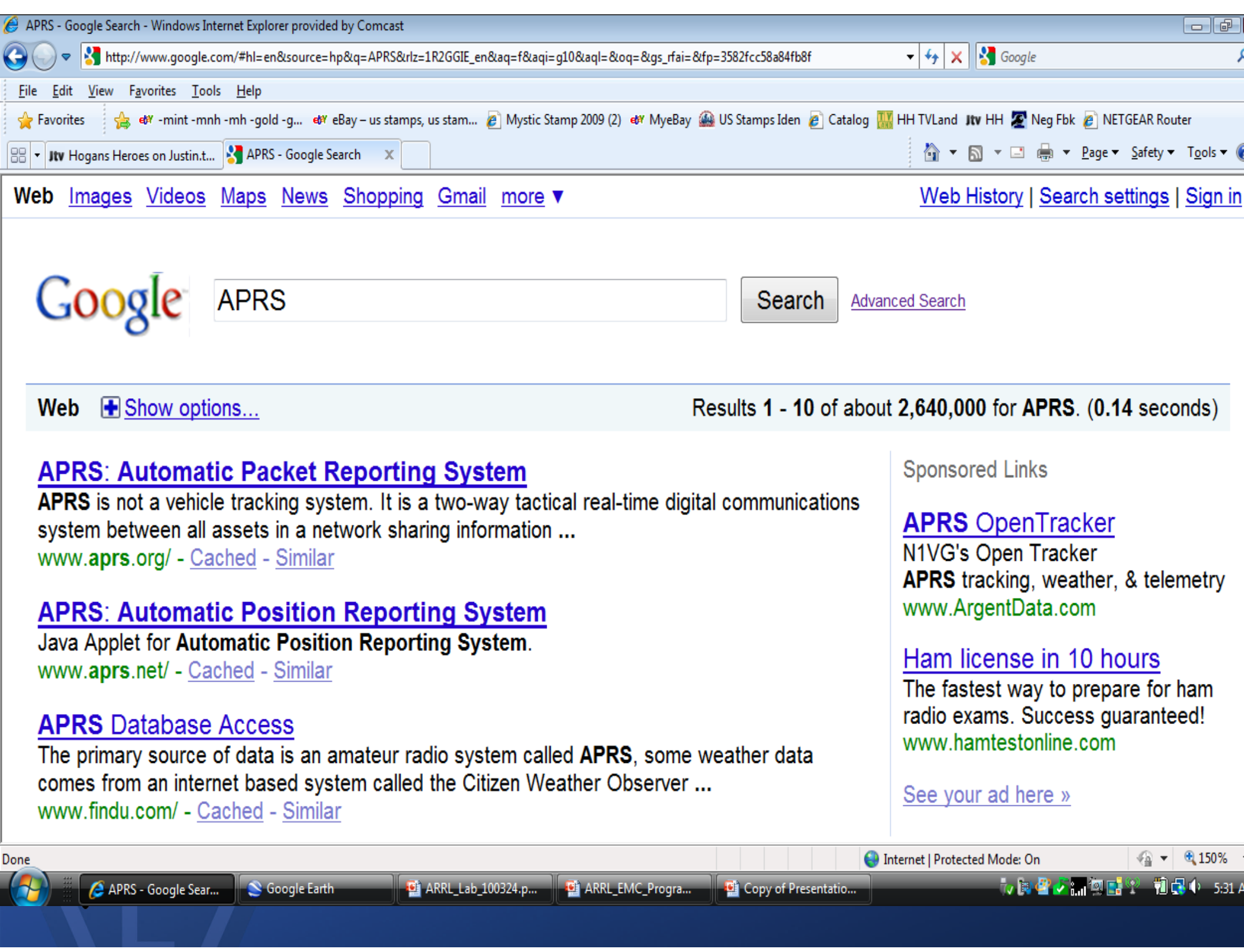

APRS - Google Search - Windows Internet Explorer provided by Comcast
http://www.google.com/#hl=en&source=hp&q=APRS&rlz=1R2GGIE_en&aq=f&aqi=g10&aql=&oq=&gs_rfai=&fp=3582fcc58a84fb8f
File Edit View Favorites Tools Help
Favorites -mint -mnh -mh -gold -g... eBay – us stamps, us stam... Mystic Stamp 2009 (2) MyeBay US Stamps Iden Catalog HH TVLand HH Neg Fbk NETGEAR Router
Hogans Heroes on Justin.t... APRS - Google Search
Page Safety Tools
Web Images Videos Maps News Shopping Gmail more
Web History | Search settings | Sign in
Google
APRS
Search
Advanced Search
Web Show options...
Results 1 - 10 of about 2,640,000 for APRS. (0.14 seconds)
APRS: Automatic Packet Reporting System
APRS is not a vehicle tracking system. It is a two-way tactical real-time digital communications system between all assets in a network sharing information ...
www.aprs.org/ - Cached - Similar
APRS: Automatic Position Reporting System
Java Applet for Automatic Position Reporting System.
www.aprs.net/ - Cached - Similar
APRS Database Access
The primary source of data is an amateur radio system called APRS, some weather data comes from an internet based system called the Citizen Weather Observer ...
www.findu.com/ - Cached - Similar
Sponsored Links
APRS OpenTracker
N1VG's Open Tracker
APRS tracking, weather, & telemetry
www.ArgentData.com
Ham license in 10 hours
The fastest way to prepare for ham radio exams. Success guaranteed!
www.hamtestonline.com
See your ad here »
Done
Internet | Protected Mode: On
150%
APRS - Google Sear...
Google Earth
ARRL_Lab_100324.p...
ARRL_EMC_Progra...
Copy of Presentatio...
5:31

Technology Web Pages

ARRL The national association for AMATEUR RADIO™

Site Login
Username
Login Forgot Password? Register

Website Search
Keyword Category GO
Call Sign / Name Search
Search Licensees GO
0 items

Home | On The Air | Licensing, Education & Training | Membership | Regulatory & Advocacy | Public Service | Technology | Get Involved | Publications & Store | About ARRL | News & Features

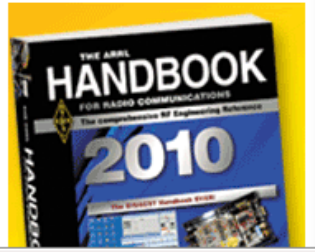
Technology

- On The Air
- Licensing, Education & Training
- Membership
- Regulatory & Advocacy
- Public Service
- Technology
  - Radio Technology Topics
  - Radio Frequency Interference (RFI)
  - ARRL Lab
- Get Involved
- Publications & Online Store
- About ARRL
- News & Features

What is Ham Radio?

Amateur Radio is Technology

Many people become Amateur Radio operators because of their interest in radio technology and experimentation. ARRL is a leader in helping amateurs learn about technology and advance the state of the art.
Learn More



ARRL and Technology

- The ARRL Laboratory

The ARRL Lab provides members and the Amateur Radio community with technical information services, trusted product-review testing, spectrum-protection engineering, professional industry contact and a comprehensive RFI/EMC program.

- The Lab mission statement

Product Review Testing

Product Review Process

- Product Review Editor, Mark Wilson, K1RO
- Goal is to review every major piece of ham equipment and some accessories
- Equipment is purchased off the shelf
- Testing is done (retest anything questionable)
- Review is written by HQ staff and technical advisors
- Review and test results sent to the manufacturer
- Review Published
- Disposition of Equipment… Auction in fall each year

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WHAT RADIO IS BEST?

Let's ask ARRL's test engineer, Bob Allison, what his favorite radio is …

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WHAT RADIO IS **BEST?**

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QST's Product Review column helps our members decide what their needs are.

- We don't tell you what radio to buy
- Casual or Serious
- Individual operating style and antenna system
- Who should you marry?

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What features Are Important ?

- Casual Operator

  Ergonomics. display, interference and noise rejection

- Contester or DXer

  Best possible performance, computer control, flexibility, dual receivers , ROOFING FILTER!

- Mobile

  Small space, detachable control panel, noise rejection

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WE HELP THE MANUFACTUER!

- **Many times the manufacturer is *unaware* of an issue.**
- **We share test methods and test results**
- **They correct the problem**
- **Everyone is happy, including our members who end up with a better product!**
- **Example: THE FLEX 3000.**

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Advertising acceptance

- **ARRL Lab staff reviews each ad that appears in ARRL publications**
- **Looking for technical accuracy**
- **Puffery okay – "Best receiver ever made!"**
- **Claims must be accurate – "Best receiver dynamic range ever tested!"**
- **Gain figures in antenna ads**
- **TVRO Innovations**

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Work with other HQ staff: One example
Allen Pitts, W1AGP,
retired ARRL Media Public Relations Manager

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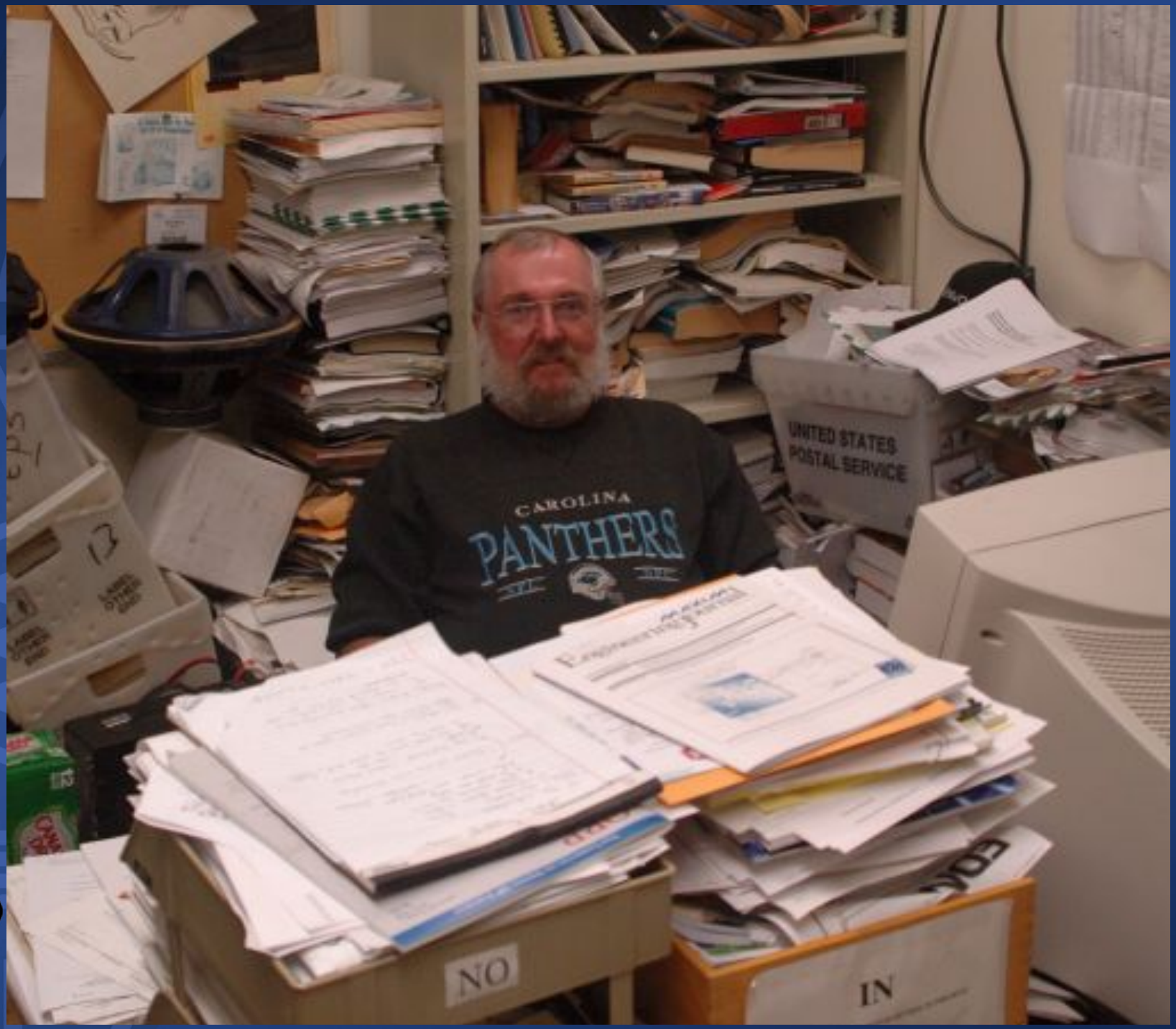
Ed at the office



ARRL EMC programs

- **ARRL RFI web pages: www.arrl.org/rfi**
- **Mike Gruber edits ARRL RFI Book, authored by HQ staff and EMC experts**
- **Measurements of noise from various devices**
- **Power-line interference cooperative program in conjunction with FCC**
- **Industry standards work**

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The Web Page

ARRLWeb: General Information about RFI/EMI - Windows Internet Explorer provided by Comcast
http://www.arrl.org/tis/info/rfigen.html
File Edit View Favorites Tools Help
ARRLWeb: General Information about RFI/EMI
ARRL The national association for AMATEUR RADIO
hamcity.com
YAESU
Find on this site... Site Index
Search site: Go
Call sign search: Go
·Classes ·Exams ·Clubs ·Hamfests ·Addresses
Members Only (W1RFI)
·QST Archive Search ·Member Data page ·QST Product Reviews ·Member FAQ ·Logout
·Doctor ·TA ·HSMM
Quick Links...
·Join or Renew ·Catalog & Store ·ARRL Courses ·Classifieds ·Getting Started
Operating Activities | Licensing | News/Bulletins | Services | Education | Public Service | Support | Donate to ARRL | ARRL Info
User Edit Text-only
RFI/EMI
RadioFrequency Interference/ElectroMagnetic Interference
ARRL Technical Information Service page · TIS Menu page
Additional information on this subject and related topics can be found in back issues of QST and the following:
The ARRL RFI Book
The ARRL has an extensive catalog of books and materials related to Amateur Radio.
An Overview
Audio Interference
Automotive Interference and Installation
Broadband Over Power Line (BPL) and Amateur Radio
Broadcast Station Interference
Cable Television Interference
Computer Interference
DSL Interference
FCC Part-15 Rules and Enforcement
Information for the Neighbors of Hams
Intermodulation
Pacemakers And Other Medical Devices
Regulatory Information
RFI Enforcement
Sounds of RFI
Telephone Interference
ARRL Products: Interference/DF
(More)
The ARRL RFI Book -- Second Edition. Practical Cures for Radio Frequency Interference.
AC Power Interference Handbook -- New insights into the causes, effects, locating and correction of power-line and electrical interference. 3rd Edition.
The RSGB Guide to EMC -- Tackle RF interference problems and understand the underlying causes.
Transmitter Hunting -- Radio Direction Finding Simplified
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Internet | Protected Mode: On
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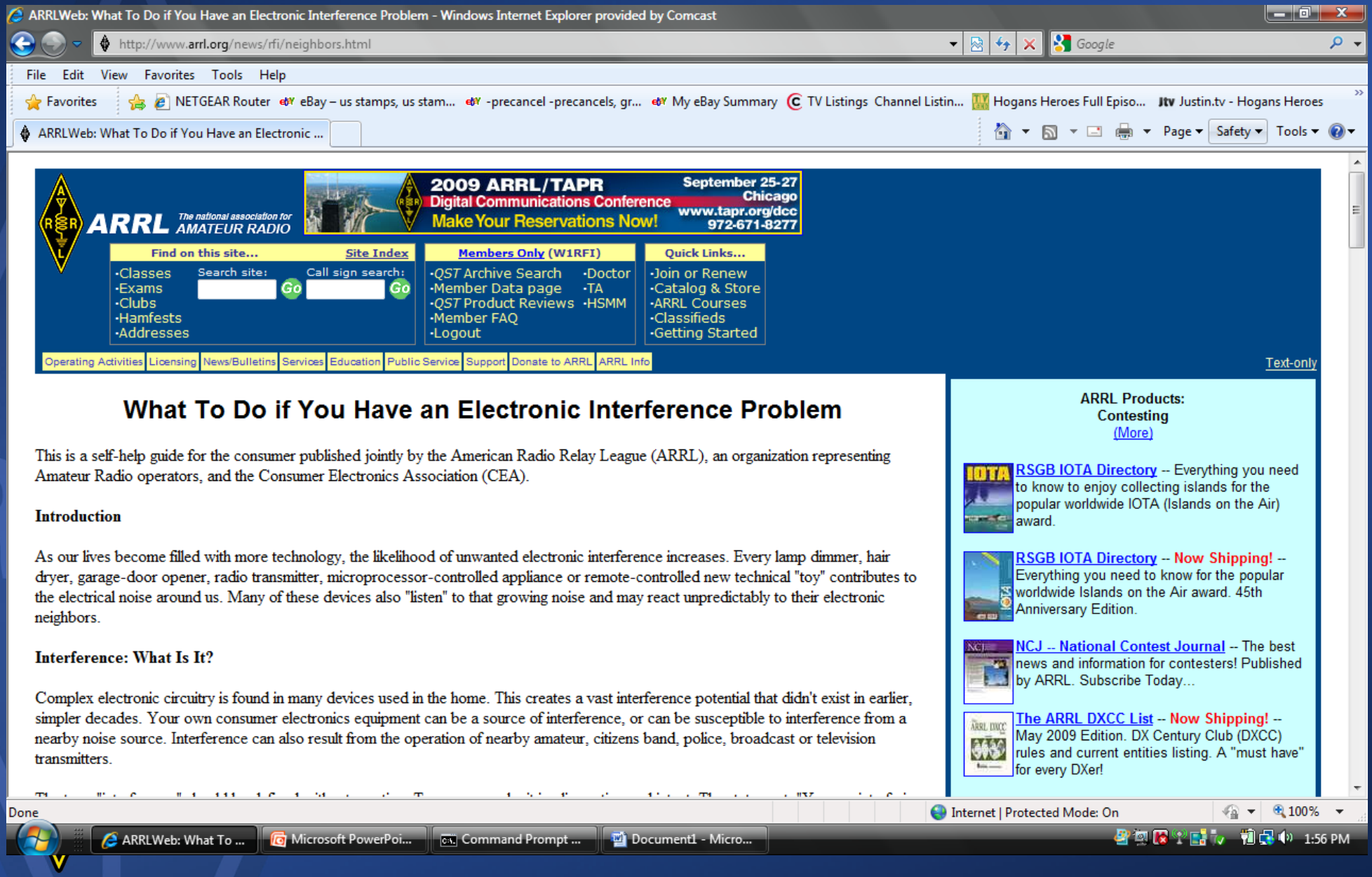
ARRLWeb: General I...
Microsoft PowerPoi...
1:53 PM

For your neighbor:


ARRLWeb: What To Do if You Have an Electronic Interference Problem - Windows Internet Explorer provided by Comcast
http://www.arrl.org/news/rfi/neighbors.html
File Edit View Favorites Tools Help
ARRL The national association for AMATEUR RADIO
2009 ARRL/TAPR Digital Communications Conference
September 25-27 Chicago
Make Your Reservations Now!
www.tapr.org/dcc
972-671-8277
Find on this site... Site Index
Search site: Go
Call sign search: Go
Members Only (W1RFI)
Quick Links...
Operating Activities Licensing News/Bulletins Services Education Public Service Support Donate to ARRL ARRL Info
Text-only
What To Do if You Have an Electronic Interference Problem
This is a self-help guide for the consumer published jointly by the American Radio Relay League (ARRL), an organization representing Amateur Radio operators, and the Consumer Electronics Association (CEA).
Introduction
As our lives become filled with more technology, the likelihood of unwanted electronic interference increases. Every lamp dimmer, hair dryer, garage-door opener, radio transmitter, microprocessor-controlled appliance or remote-controlled new technical "toy" contributes to the electrical noise around us. Many of these devices also "listen" to that growing noise and may react unpredictably to their electronic neighbors.
Interference: What Is It?
Complex electronic circuitry is found in many devices used in the home. This creates a vast interference potential that didn't exist in earlier, simpler decades. Your own consumer electronics equipment can be a source of interference, or can be susceptible to interference from a nearby noise source. Interference can also result from the operation of nearby amateur, citizens band, police, broadcast or television transmitters.
ARRL Products: Contesting
(More)
RSGB IOTA Directory -- Everything you need to know to enjoy collecting islands for the popular worldwide IOTA (Islands on the Air) award.
RSGB IOTA Directory -- Now Shipping! -- Everything you need to know for the popular worldwide Islands on the Air award. 45th Anniversary Edition.
NCJ -- National Contest Journal -- The best news and information for contesters! Published by ARRL. Subscribe Today...
The ARRL DXCC List -- Now Shipping! -- May 2009 Edition. DX Century Club (DXCC) rules and current entities listing. A "must have" for every DXer!
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Internet | Protected Mode: On
100%
ARRLWeb: What To ...
Microsoft PowerPoi...
Command Prompt ...
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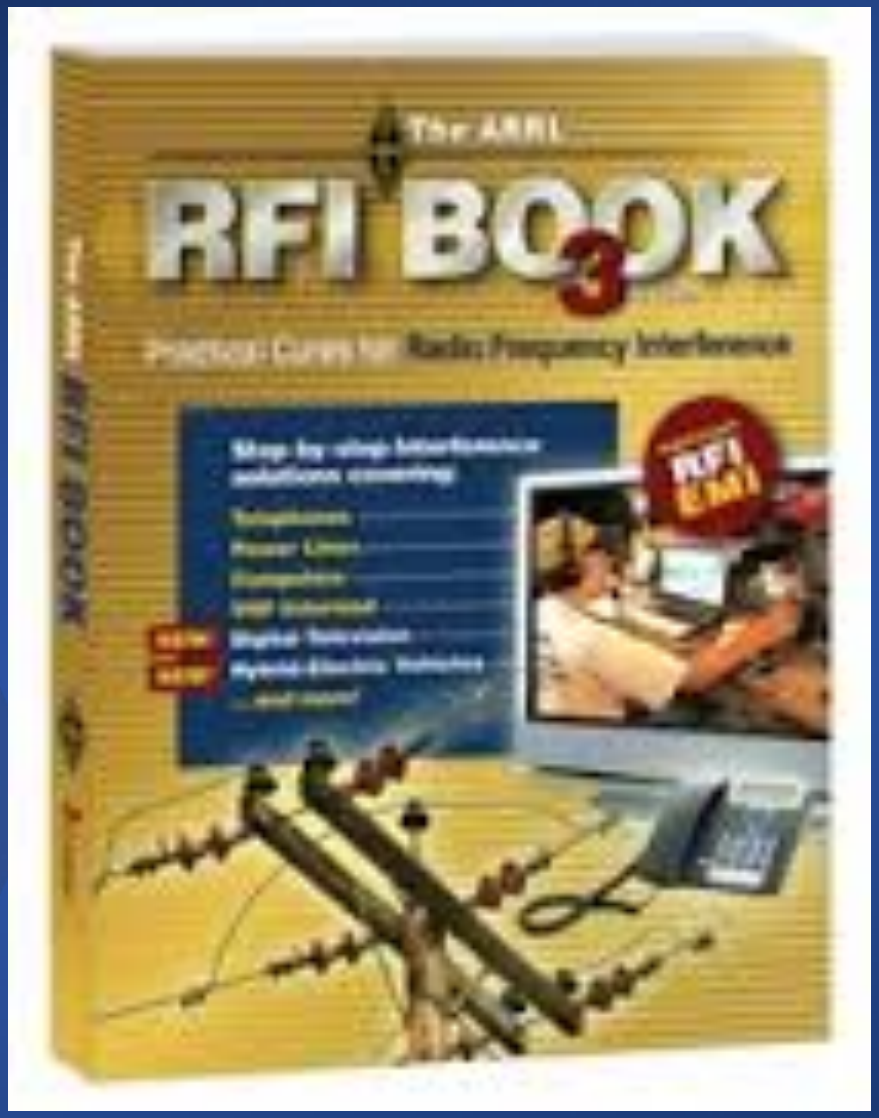
And, Of Course…



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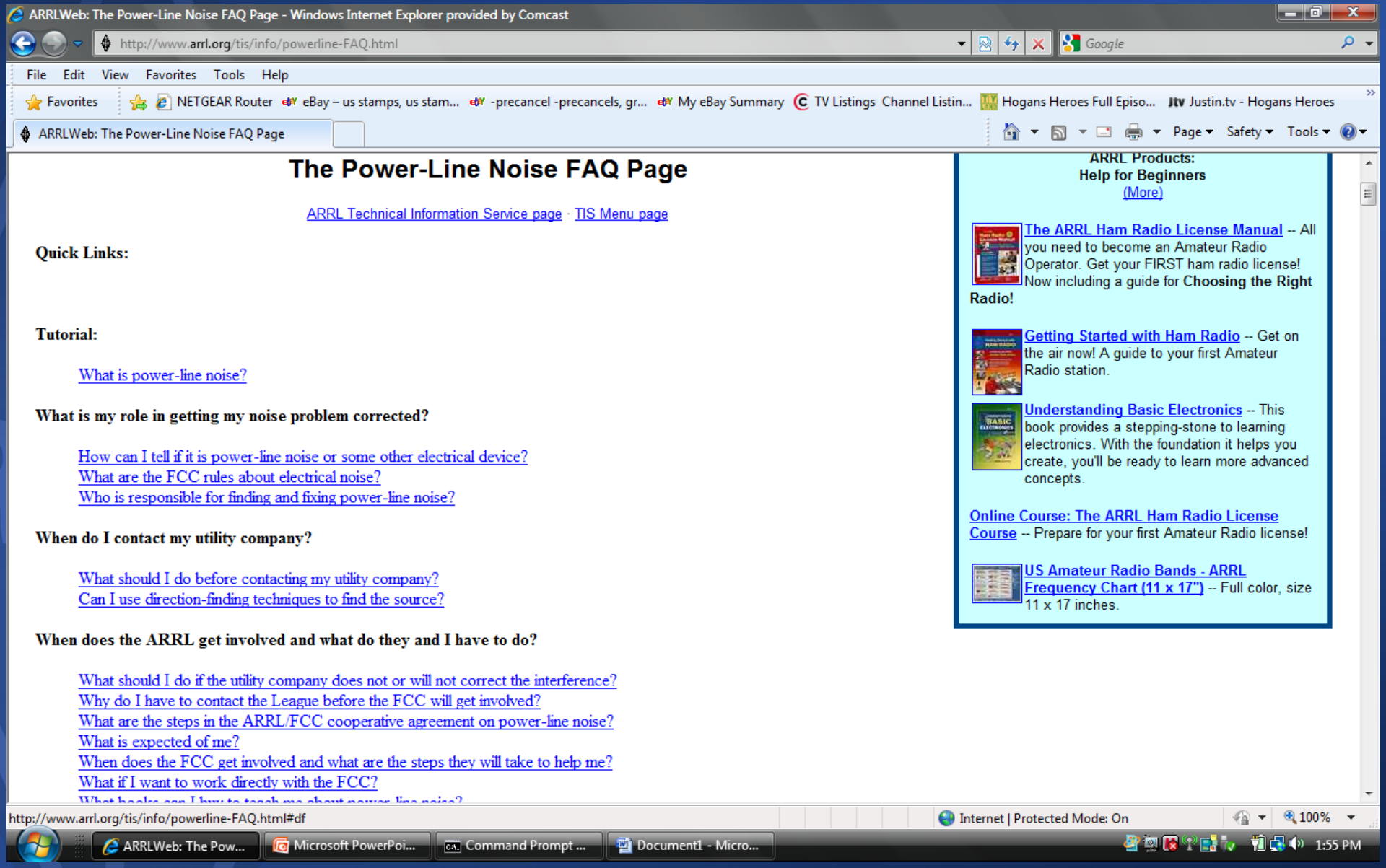
Power-line RFI web page


ARRLWeb: The Power-Line Noise FAQ Page - Windows Internet Explorer provided by Comcast
http://www.arrl.org/tis/info/powerline-FAQ.html
File Edit View Favorites Tools Help
ARRLWeb: The Power-Line Noise FAQ Page
The Power-Line Noise FAQ Page
ARRL Technical Information Service page · TIS Menu page
Quick Links:
Tutorial:
What is power-line noise?
What is my role in getting my noise problem corrected?
How can I tell if it is power-line noise or some other electrical device?
What are the FCC rules about electrical noise?
Who is responsible for finding and fixing power-line noise?
When do I contact my utility company?
What should I do before contacting my utility company?
Can I use direction-finding techniques to find the source?
When does the ARRL get involved and what do they and I have to do?
What should I do if the utility company does not or will not correct the interference?
Why do I have to contact the League before the FCC will get involved?
What are the steps in the ARRL/FCC cooperative agreement on power-line noise?
What is expected of me?
When does the FCC get involved and what are the steps they will take to help me?
What if I want to work directly with the FCC?
ARRL Products:
Help for Beginners
(More)
The ARRL Ham Radio License Manual -- All you need to become an Amateur Radio Operator. Get your FIRST ham radio license! Now including a guide for Choosing the Right Radio!
Getting Started with Ham Radio -- Get on the air now! A guide to your first Amateur Radio station.
Understanding Basic Electronics -- This book provides a stepping-stone to learning electronics. With the foundation it helps you create, you'll be ready to learn more advanced concepts.
Online Course: The ARRL Ham Radio License Course -- Prepare for your first Amateur Radio license!
US Amateur Radio Bands - ARRL Frequency Chart (11 x 17") -- Full color, size 11 x 17 inches.
http://www.arrl.org/tis/info/powerline-FAQ.html#df
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Power-line noise and FCC:

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ARRL Power-line cooperative agreement with the FCC

- **Multi-step process**
- **Complainant tries to resolve case with the utility**
- **ARRL tries to resolve case with utility**
- **ARRL turns case over to the FCC**
- **FCC contacts the utility, advisory letter**
- **60 day window**
- **Second FCC contact, sets requirement for biweekly reporting**

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ARRLWeb: FCC Enforcement Letters - Windows Internet Explorer provided by Comcast
http://www.arrl.org/tis/info/HTML/plc/FCC_enforcement/FCC_Enforcement_Letters.html
c63 site:arrl.org
File Edit View Favorites Tools Help
Favorites NETGEAR Router eBay – us stamps, us stam... -precancel -precancels, gr... My eBay Summary TV Listings Channel Listin... Hogans Heroes Full Episo... Justin.tv - Hogans Heroes
ARRLWeb: FCC Enforcement Letters
Page Safety Tools

The following list links to copies of the FCC enforcement letters sent to electric-utility companies about harmful interference reports:

- Allegheny Power, Greensburg, PA
- Alliant Energy, Madison, WI
- Alliant Energy, Madison, WI #2
- Alliant Energy, Madison, WI #3
- American Electric Power, Columbus, OH
- American Electric Power, Columbus, OH #2
- American Electric Power, Columbus, OH #3
- American Electric Power, Columbus, OH #4
- American Electric Power, Columbus, OH #5
- American Electric Power, Columbus, OH #6
- American Electric Power, Columbus, OH #7
- AmerenUE, St. Louis, MO
- Appalacian Power Company, Charleston, WV
- Appalacian Power Company, Charleston, WV #2
- Aquila Inc., Kansas City, MO
- Austin Energy, Austin, TX
- Austin Energy, Austin, TX #2
- CenterPoint Energy, Houston, TX
- Chatanooga Electric Power, Chatanooga, TN
- Cinergy Corporation, Cincinnati, OH
- City of Anderson, IN
- City of Bolivar, TN
- City Utilities, Springfield, MO
- CMS Energy, Dearborn, MI
- CMS Energy, Dearborn, MI #2
- CMS Energy, Dearborn, MI #3
- Commonwealth Edison, Chicago, IL
- Commonwealth Edison, Chicago, IL #2
- Cumberland Electric, Cumberland, MD

Waiting for http://www.arrl.org/tis/info/HTML/plc/FCC_enforcement/FCC_Enforcement_Letters.html...
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100%
ARRLWeb: FCC Enfo... Microsoft PowerPoi... Command Prompt ... Document1 - Micro...
2:17 PM

Success

FCC Issues Two *Citations* in Longstanding Power Line Noise Ca

Doug Hutton, W5JUV, verifies the noise source at the east entrance to an alley between 68th and 69th Streets in Lubbock, Texas.

The Federal Communication Commissio
two utilities in a longstanding power l
W5KFT, of Lubbock, first reported t
Lubbock Power & Light (LP&L) and
the FCC Dallas Field Office clarified the
as early as 1998, and issued three lette
issued an FCC letter in 2004.

Mike Gruber, W1MG, of the ARRL's
visiting Lubbock on vacation in Septemb
there was a severe and widespread pow
field investigation later that same month.
the utility companies and the FCC, the
utility. Robert Darling of the FCC conc

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Failure

- Some cases have dragged on for years
- Utilities often spend orders of magnitude more money not fixing power-line noise than it would take to fix it.
- Note in list I just showed that some utilities have received multiple letters
- Some utility staff not competent to find power-line noise
- Utilities need information

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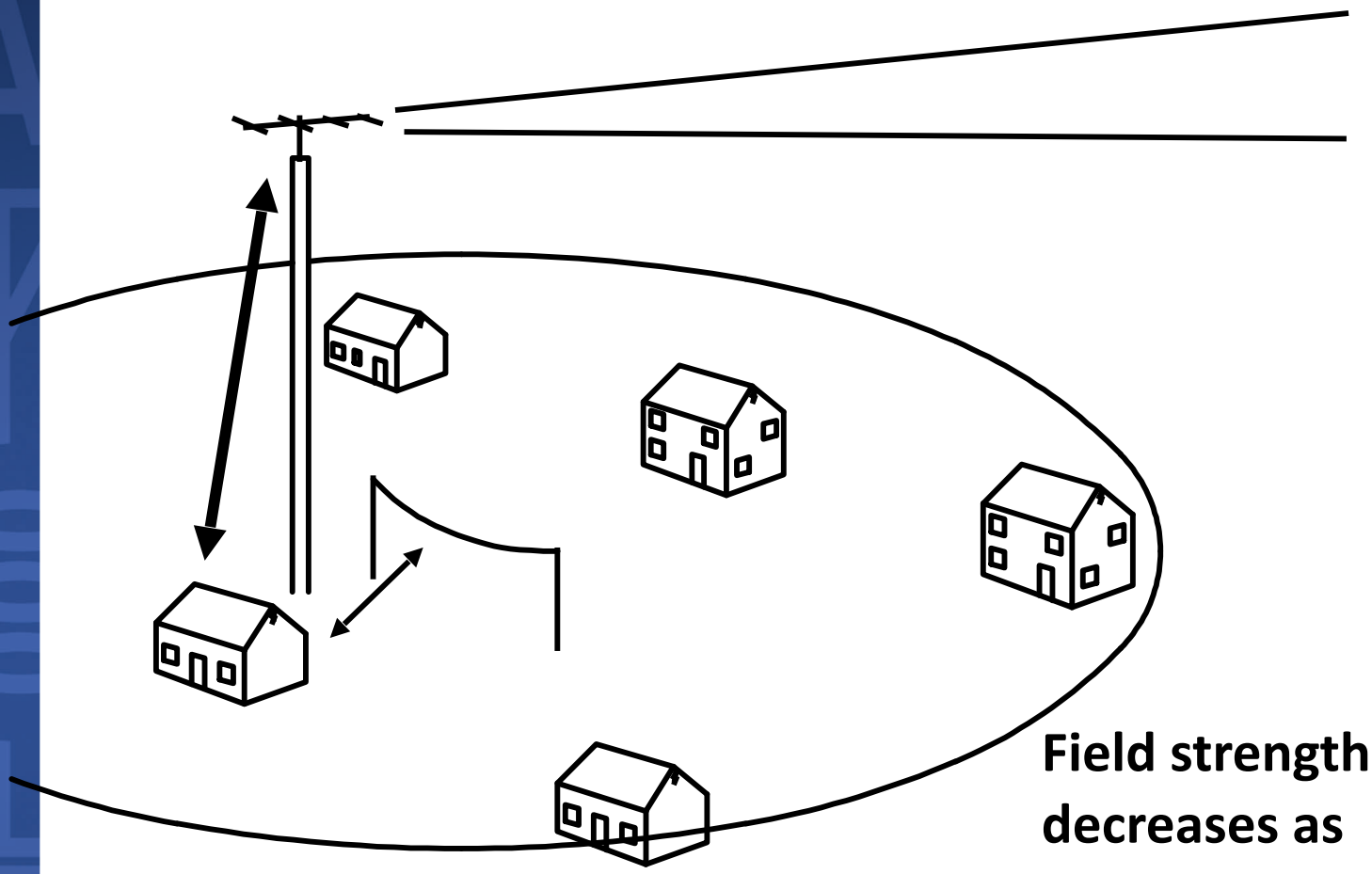
Antenna height and distance:



Field strength decreases as the square of the distance.

ARRL

Industry committee work

- Amateur Radio does not exist in a vacuum
- It must be well connected to the rest of radio technology
- Industry contact is one important way to do that
- Industry organizational contact: IEEE, Consumer Electronic Manufacturers Association, HomePlug, National Cable Telecommunications Association, etc.
- Individual companies
- Industry standards committees

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ARRL industry committee participation

- Society of Automotive Engineers
- ANSI asc C63® (EMC committee)
- IEEE working groups
- IEEE EMC Society Board of Directors
- IEEE EMC Society Standards Development Committee
- ARRL staff serve in leadership positions on these committees

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SDCom Main Menu

- Committee Scope and Purpose
- EMC Standards List
- Committee Documents
- Approved Minutes
- SDCom Archives
- Guidance for WG Officers
- Help for Standards Developers

Upcoming Meetings:

The Standards Development Committee meetings are open to all who want to attend. Contact the Secretary for information.

SDCom Meeting San Diego, CA 11 March 2010 10AM-2PM
Contact - Chairman, Andy Drozd
Contact - SDCom Secretary
Draft agenda
Hotel and meeting location information:
Grande Colonial Hotel
910 Prospect St.
La Jolla, CA 92037
Front Desk Phone: 858-454-2181
Reservation Phone: 888-530-5766
Web: www.gclj.com
Email for reservations made outside the US: info@gclj.com *(Please put "To Kate for Guest Room Reservations" in the subject of the email.)*
Rate: $159.00 plus tax for single or double occupancy (add $10 for any additional guests), includes complimentary internet access in the meeting rooms and guest rooms. Group

Standards Development Committee Home Page

Committee Scope and Purpose

The IEEE EMC Society Standards Development Committee is responsible for guiding the development of IEEE EMC Standards. The IEEE EMC Society is the primary international developer of fundamental test and measurement standards for EMC.

Officers

Chair	Andy Drozd	ANDRO Computational Solutions
Vice-Chair	Colin Brench	Southwest Research Institute
Secretary	Ed Hare	ARRL

Membership Roster

Name	Affiliation
Andrew Drozd, Chair	Andro Computational Solutions
Colin Brench, Vice Chair	Southwest Research Institute
Ed Hare, Secretary	ARRL
Stephen Berger	TEM Consulting
Dick Ford	Naval Research Lab

http://p1k.arrl.org/~mgruber/IEEE_PLN/Recomended_Practice_Rev_L.pdf - Windows Internet Explorer provided by Comcast
http://p1k.arrl.org/~mgruber/IEEE_PLN/Recomended_Practice_Rev_L.pdf
File Edit Go To Favorites Help
Favorites NETGEAR Router eBay – us stamps, us stam... -precancel -precancels, gr... My eBay Summary TV Listings Channel Listin... Hogans Heroes Full Episo... Justin.tv - Hogans Heroes
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1 / 45 130% Find

IEEE P<designation>™/D1.0
Draft Trial-Use Recommended Practice for For Location of Power Line Gap Noise

Prepared by the Power Line Noise Working Group of the

Power Line RFI Committee

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Downloaded (278.59 KB of 863.77 KB) : http://p1k.arrl.org/~mgruber/IEEE_PLN/Recomended_Practice_Rev_L.pdf
Unknown Zone | Protected Mode: On
Microsoft Outlook ... FW: Power line nois... http://p1k.arrl.org/... Microsoft PowerPoi... Command Prompt ... Document1 - Micro... 2:20 PM

Industry and Organizational

- HomePlug
- Home Phone Networking Alliance
- National Cable Telecommunications Association
- Electric Power Research Institute
- FCC

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http://p1k.arrl.org/~ehare/bpl/HomePlug_ARRL.pdf - Windows Internet Explorer provided by Comcast
http://p1k.arrl.org/~ehare/bpl/HomePlug_ARRL.pdf
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http://p1k.arrl.org/~ehare/bpl/HomePlug_ARRL....
Page Safety Tools
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Click to fill the window with each page and scroll through pages continuously

HomePlug & ARRL Joint Test Report
January 24, 2001
Testing Conducted December 13, 14, 2000

Representatives from HomePlug and ARRL performed joint testing of HomePlug's proposed waveform and power spectral density (PSD) limits at ARRL headquarters and a nearby site on December 13 and 14, 2000. This work was conducted in cooperation under non-disclosure

Done
Unknown Zone | Protected Mode: On
http://p1k.arrl.org/... FW: Power line nois... http://p1k.arrl.org/... Microsoft PowerPoi... Command Prompt ... Document1 - Micro... 2:30 PM

Spectrum protection

- **Work with industry – just saw a few examples**
- **Work for ARRL's DC offices**
- **Studies and papers**
- **Field testing**
- **Conducted emissions testing**

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ROHDE & SCHWARZ · MESSEMPFÄNGER · TEST RECEIVER · 20 - 1300 MHz · ESVP

Grow Lights

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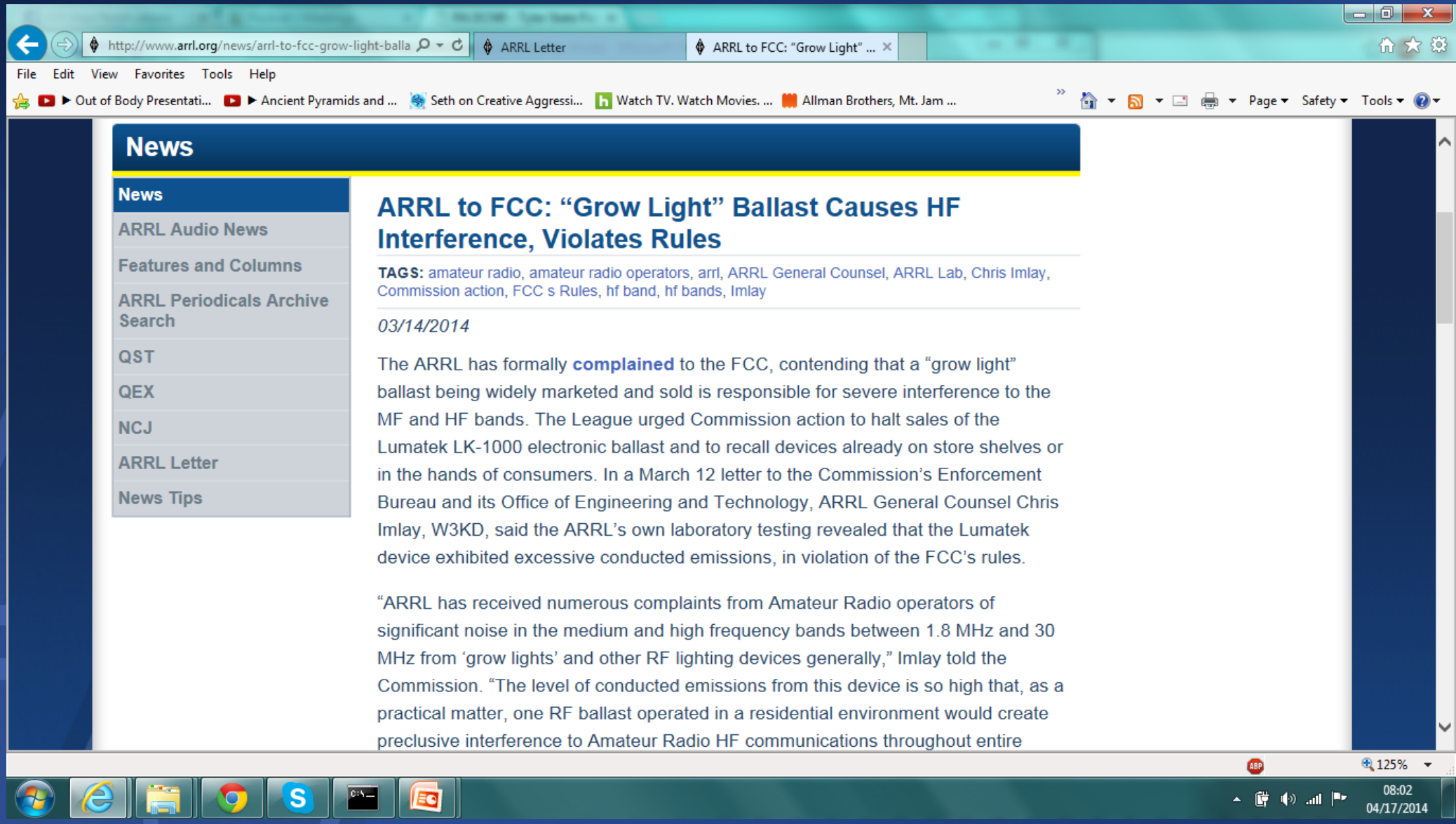
http://www.arrl.org/news/arrl-to-fcc-grow-light-balla
ARRL Letter
ARRL to FCC: "Grow Light" ...
File Edit View Favorites Tools Help
Out of Body Presentati...
Ancient Pyramids and ...
Seth on Creative Aggressi...
Watch TV. Watch Movies. ...
Allman Brothers, Mt. Jam ...
Page Safety Tools
News
News
ARRL Audio News
Features and Columns
ARRL Periodicals Archive Search
QST
QEX
NCJ
ARRL Letter
News Tips
ARRL to FCC: "Grow Light" Ballast Causes HF Interference, Violates Rules
TAGS: amateur radio, amateur radio operators, arrl, ARRL General Counsel, ARRL Lab, Chris Imlay, Commission action, FCC s Rules, hf band, hf bands, Imlay
03/14/2014
The ARRL has formally complained to the FCC, contending that a "grow light" ballast being widely marketed and sold is responsible for severe interference to the MF and HF bands. The League urged Commission action to halt sales of the Lumatek LK-1000 electronic ballast and to recall devices already on store shelves or in the hands of consumers. In a March 12 letter to the Commission's Enforcement Bureau and its Office of Engineering and Technology, ARRL General Counsel Chris Imlay, W3KD, said the ARRL's own laboratory testing revealed that the Lumatek device exhibited excessive conducted emissions, in violation of the FCC's rules.
"ARRL has received numerous complaints from Amateur Radio operators of significant noise in the medium and high frequency bands between 1.8 MHz and 30 MHz from 'grow lights' and other RF lighting devices generally," Imlay told the Commission. "The level of conducted emissions from this device is so high that, as a practical matter, one RF ballast operated in a residential environment would create preclusive interference to Amateur Radio HF communications throughout entire
125%
08:02
04/17/2014

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Arc Fault Circuit Breakers

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Other

- RF safety rules
- Recon Robotics: emergency cameras, 70 cm
- Savi Technologies: RFID, 70 cm
- PAVE-PAWS military radar

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Q&A
a.k.a. Stump the Speaker

- Rick Roderick, Barack Obama, Darrell Davis and Bo Derek

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MORE INFORMATION

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